Statistical methods in natural sciences (VT 2024)

Location: Room 1003 at EBC. Floor 1, entrance Norbyvägen 18D.
Course text book: *Quinn, G.P. and Keough M.J. 2002. Experimental design and data analysis for biologists. Cambridge.* This very good, classic and general book (although examples are biological) is required reading, and should be purchased, borrowed or otherwise be made available, well ahead of time by everyone taking the course.
I note that the course book is also available in electronic format (as a PDF) on the web.
Note 1: The course **assumes** that you have a basic understandning of statistical estimation and inference (make sure to look at / **read chapters 1-3** in the course text book and make sure you understand!).
Note 2: The course is an on-campus course.
Teachers: Göran Arnqvist (Goran.Arnqvist@ebc.uu.se). Responsible for the practicals is Patrik Rödin Mörch (patrik.rodin-morch@ebc.uu.se).
The course runs on Tuesday and Thursday afternoons, apart from the dates marked with red font.

Date	Time	Topic	Reading [1]
Tue 23/1	13.00 -15.30	**Course start** - information and introduction. **L1**: Statistical inference, power analysis and experimental design. Introduction to practical I. Brief introduction to statistical software (at the end).	Pp 32-44; 155-172; A.
Thu 25/1	12.00 -13.00 [2]	*R support/workshop*	
Thu 25/1	13.00 -15.30	**L1** continued and **L2**: Meta-analysis. Presentation of practical I.	Pp 50-51; A.
Tue 30/1	13.00 -15.30	**L3**: Linear regression and multiple regression analysis.	Pp 72-99; 111-142.
Thu 1/2	13.00 -15.30	**L4**: One-way analysis of variance and F-tests, transformations of data.	Pp 58-68; 173-207.
Tue 6/2	13.00 -15.30	**L5**: More complex linear models: nested, factorial, randomized blocks and repeated measures designs.	Pp 208-254; 262-273; 301-315.
Thu 8/2	13.00 -15.00	**L6:** Analysis of covariance. Introduction to practical II.	Pp 339-352.
Tue 13/2	12.00 -13.00 [2]	*R support/workshop*	
Tue 13/2	13.00 -15.30	Presentation of practical II.	
Thu 15/2	13.00 -15.30	**L7:** Generalized linear models, including logistic regression and linear models with Poisson and binomial errors. Introduction to practical III.	Pp 359-372.
Tue 20/2	12.00 -13.00 [2]	*R support/workshop*	
Tue 20/2	13.00 -15.30	Presentation of practical III.	
Thu 22/2	13.00 -15.30	**L8:** Resampling and randomization techniques; χ^2 based analyses of frequencies. Introduction to practical IV.	Pp 25-26; 45.
Mon 26/2	12.00 -13.00 [2]	*R support/workshop*	
Mon 26/2	13.00 -15.30	**L9**: Multivariate methods I: Principal Component Analysis, Discriminant Function Analysis and Manova. Presentation of practical IV.	Pp 401-417; 425-458.
Thu 29/2	13.00 -15.30	**L10**: Multivariate methods II: multivariate classification and ordination techniques. Introduction to practical V.	Pp 459-493.
Tue 5/3	12.00 -13.00 [2]	*R support/workshop*	
Tue 5/3	13.00 -15.30	Presentation of practical V.	
Thu 7/3	13.00 -15.30	**L11:** Other current topics in statistics (morphometrics, Bayesian inference, mcmc estimation)	A
Mon 11/3	13.00 -15.30	Final literature discussion - discuss book and solve/discuss a series of hand-out questions.	

[1] Page numbers refer to the course text book; A = refers to separate material that will be distributed by email.

[2] Non-mandatory **R** support session, for those that want and/or need some help to make progress with the practicals in R (scripting etc).